Decision Document
Building 106-10 Underground Storage Tank Site
Hawthorne Army Depot
Hawthorne, Nevada
February 1996

1.0 PURPOSE OF DECISION DOCUMENT

This decision document describes the rationale for the proposed closure of the Building 106-10 underground storage tank site at the Hawthorne Army Depot (HWAD), Hawthorne, Nevada. This decision document was developed for the US Army Corps of Engineers, Sacramento District (USACE), and the HWAD, with support from the Nevada Department of Conservation and Natural Resources, Division of Environmental Protection (NDEP).

1.1 Site Description

The Building 106-10 site is located approximately one mile north-northeast of the HWAD main gate. This site is the location of a former 75-gallon underground storage tank (UST) used to store #2 diesel fuel. The UST was removed from the site by excavating a 10 foot by 10 foot area (100 square feet). The excavation has been backfilled with clean soil.

The UST was removed from the site on 8 October 1991. Immediately after the removal, one soil sample was collected from beneath the center of the former tank's location. The sample was reportedly collected from a depth of five feet (Bramco), however there is no record if the depth refers to feet below ground surface (bgs) or feet below the base of the excavation. Based on the reported depth to the top of the UST and its diameter, it is assumed the sample was collected from five feet bgs.

The sample was analyzed for total petroleum hydrocarbons as diesel (TPH-d), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), pesticides, and eight metals regulated under the Resource Conservation and Recovery Act (RCRA) using the toxicity characteristic leaching procedure (TCLP). The reported concentration of TPH-d was 2,600 milligrams per kilogram (mg/kg). VOCs, pesticides, and PCBs were not detected in the sample, and the eight RCRA metals were not found at high concentrations.

In 1992 the United States Army Environmental Hygiene Agency (USAEHA) backfilled the excavation with clean soil and supervised the drilling of one soil boring in the center of the former excavation. Soil samples were collected from depths of 15 and 25 feet bgs in the borehole. Concentrations of TPH-d in both of these samples were reported to be below the laboratory detection limit.

The soil types of the samples collected from the boring were described in the USAEHA report as poorly graded and well graded sands, and clayey silt. Ground water was encountered in the boring at a depth of 21 feet bgs. The regional ground water flow direction is north-northwest towards Walker Lake, but in the vicinity of the Building 106-10 site, the flow direction may be

altered by the influence of pumping from supply wells, and/or recharge from a nearby wastewater treatment facility.

2.0 SUMMARY OF SITE RISK

The only detection of contaminants at the Building 106-10 site was 2,600 mg/kg TPH-d from the soil sample collected in 1991 at a depth of five feet bgs beneath the location of the former UST. This sample contained no concentration of VOCs, PCBs, pesticides or high concentration of metals commonly associated with petroleum hydrocarbon fuels. Soil samples collected from a subsequent boring at depths of 15 and 25 feet bgs contained no quantifiable concentration of contaminants. Therefore, the soils impacted by the release of petroleum hydrocarbon compounds from the tank appears to be limited to the near surface soils of less than 15 feet bgs within the area of the former UST excavation.

The principal pathways for potential exposure to these contaminants are 1) through surface contact, and 2) through migration of these contaminants downward through the vadose zone to the ground water table, followed by lateral advective movement in the saturated zone to a point of contact. The impacted soils have been covered with non-contaminated soils. Therefore, the first proposed pathway through surface contact has been eliminated. The second proposed pathway through migration to the ground water is evaluated below.

There are three principal processes that affect petroleum hydrocarbon contaminants in the vadose zone:

- The force of gravity will pull the free-phase liquid vertically downward. Infiltrating precipitation will accelerate this downward migration rate, however, the HWAD is in an arid climate where annual precipitation rates are low. Therefore, this leaching factor does not need to be considered.

- Adsorption of the petroleum hydrocarbon compounds by soil particles reduces the mass fuel available for downward migration.

- Biodegradation of the fuel-contaminated soils by naturally occurring bacteria will reduce the mass of fuel available for downward migration.

A method of estimating the volume of fuel necessary to overcome the effects of adsorption and reach the water table is presented in the US Environmental Protection Agency's (EPA) document *Underground Technology Update, Volume 4, Number 4, August 1994.*

"Soil porosity and bulk hydrocarbon physical characteristics will determine the soil volume (Vs) necessary to immobilize a release (through adsorption)." This soil volume, in cubic yards, can be estimated by the following formula:

$Vs = (0.2) \times (Vhc)/(P) \times (RS)$, where;

Vhc is the volume of discharged hydrocarbons, in barrels (one barrel is equal to 44 gallons);

P is the effective soil porosity; and

RS is the residual saturation capacity.

The residual saturation capacity of soils is generally about 33 percent of the soil's water holding capacity. As stated in the EPA document, RS values for various hydrocarbon compounds are as follows:

- Light oil and gasoline = 0.1
- Used and fuel oil = 0.15
- Lube and heavy oil = 0.2

For this site, where #2 diesel fuel was reportedly stored, the RS value of 0.15 will be used.

To calculate the minimum amount of hydrocarbon release needed to impact the ground water ($Vhc_{to\ impact}$) from a tank release at a depth of five feet bgs to the water table at 21 feet bgs over a 100 square foot area, the above equation may be used as follows:

$Vs = [(21\ ft) - (5\ ft)] \times 100\ ft^2 = 1{,}600\ ft^3 = 59.3$ cubic yards

P = 25 percent = 0.25 (assumed for poorly graded and well graded sands)

RS = 0.15

$Vhc_{to\ impact} = (Vs) \times (P) \times (RS)/(0.2) = (59.3) \times (0.25) \times (0.15)/(0.2)$

$Vhc_{to\ impact}$ = 11 barrels = 484 gallons

Therefore, the volume of a #2 diesel fuel release from a depth of five feet from the former UST at the Building 106-10 site that would be necessary for petroleum hydrocarbon compounds to impact the ground water at a depth of 21 feet is 484 gallons of fuel.

The soil sample collected from a depth of five feet bgs was contaminated, however no contaminants were detected in the samples collected from depths of 15 and 25 feet. A conservative assumption of the depth of soil contamination is therefore 15 feet bgs. Assuming that all of the pore space in the soils within the 100 square foot area of the former excavation between the depths of five feet bgs and 15 feet bgs contained free-phase liquid fuel, the volume of mobile petroleum hydrocarbon compounds release ($Vhc_{max\ released}$) can be calculated using the same equations:

$Vs = [(15\ ft) - (5\ ft)] \times 100\ ft^2 = 1{,}000\ ft^3 = 37$ cubic yards

P = 25 percent = 0.25

RS = 0.15

$(Vhc_{max\ released}) = (Vs) \times (P) \times (RS)/(0.2) = (37) \times (0.25) \times (0.15)/(0.2)$
$(Vhc_{max\ released})$ = 7 barrels = 308 gallons

Therefore, the calculated maximum volume of mobile petroleum hydrocarbon compounds from the released fuel is 308 gallons

Since $Vhc_{to\ impact}$ (484 gallons) is larger than $Vhc_{max\ released}$ (308 gallons), the calculated remaining mobile petroleum hydrocarbon compounds at the Building 106-10 site does not appear to be sufficient for vertical migration of these compounds through the vadose zone. Based on these calculations, the adsorption of the petroleum hydrocarbon compounds by the soil particles is sufficient to reduce the mass available for downward migration to the extent that the released fuel will not impact the ground water. Naturally occurring biodegradation, if present, will further reduce the mass of fuel available for migration. Therefore, the migration pathway to the ground water at this site does not likely exist.

These calculations show that there are no potential exposure pathways at the former UST site that would pose a threat to human health or the environment. Therefore, it is recommended that the site be closed with regard to the release of fuel from the former UST without further remedial actions.

3.0 PUBLIC/COMMUNITY INVOLVEMENT

It is US Department of Defense (DOD) and Army policy to involve the local community throughout the investigation process at an installation. To initiate this involvement, HWAD has established a repository library in the local public library that includes final copies of all past studies and documents regarding environmental issues at the facility. This repository will be maintained and updated with all future final documents as they are issued to HWAD.

HWAD has solicited community participation in establishment of the restoration advisory board (RAB). However, because of insufficient public response, HWAD has not formed a RAB. HWAD will continue to solicit community involvement, if sufficient community interest can be obtained.

4.0 DECLARATION

Based on the investigation data, petroleum hydrocarbon compounds as diesel are known to occur in the soils at concentrations above the HWAD basewide proposed closure goal (PCG) of 100 mg/kg for diesel, which has preliminary acceptance from the NDEP as lead agency for the site. However, based on the summary of site risk in this document, it has been shown that there are no potential exposure pathways for this contamination to impact human health or the environment. Unless future information is forthcoming that would necessitate the reevaluation of the site, it is recommended that this site be closed with regard to the release of fuel from the former UST with no further actions. Therefore, the selected remedy for this site is the no further action alternative.

The selected remedy is protective of human health and the environment, and a waiver can be justified for the Federal and State applicable or relevant and appropriate requirements (ARARs) that will not be met. It has been shown that a complete exposure pathway to human health and the environment does not likely exist, and there is no likely potential for such an exposure pathway to be completed in the future.

9/12/96
Date

US ARMY

By: [signature]

Title: COMMANDER, HEAD

10/3/96
Date

STATE OF NEVADA

By: [signature]

Title: EMS III

General References

Bramco Construction Corp., October 11, 1991. Correspondence to Day and Zimmerman/Basil Corp., Subject: Underground Storage Tank Project #91-C-1565, Building 106-10.

USAEHA, 10-21, August 1992. Geohydrologic Study No. 38-26-KP66-92, Former Underground Storage Tank Sites, HWAAP, Hawthorne, Nevada.

US Environmental Protection Agency, August 1994. Underground Technology Update, Volume 4, Number 4.